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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,590	06/23/2003	Kyung Man Kim	8733.853.00	5502

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MCKENNA LONG & ALDRIDGE LLP  
1900 K STREET, NW  
WASHINGTON, DC 20006

EXAMINER

ROY, SIKHA

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/600,590

Applicant(s)

KIM, KYUNG MAN

Examiner

Sikha Roy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 9-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

The Amendment, filed on March 30, 2005 has been entered and acknowledged by the Examiner.

Cancellation of claim 8 has been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9-12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,707,248 to Burroughes et al., and further in view of U.S. Patent 6,255,774 to Pichler.

Regarding claim 1 Burroughes discloses (Fig. 2 column 3 lines 29-35 column 4 lines 6-50) an organic electroluminescent device comprising an anode substrate 10, a thin organic layer (active layer) having hole transport or injecting layer 13, organic light-emitting layer 15, electron transport layer and a cathode 11 stacked sequentially and the cathode comprising three electrodes (layers) – first layer 15 of Ca, second layer 16 of lithium and third layer 17 of Al, stacked on the organic active region.

Burroughes does not exemplify the cathode comprising fourth electrode.

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Pichler in analogous art of multilayer cathode for organic light-emitting device discloses (column 1 line 67 through column 2 line 28, column 3 lines 58-67) the cathode comprising a thin layer 4 of an alkali metal and the thin layer covered with a conductive layer 5 of aluminum or aluminum alloy. Pichler further discloses such structure with a thin layer of alkali metal or alkaline earth metal covered with a conductive layer provides efficient injection of negative charge carriers and low operating voltage but prevents excessive doping and minimizes the risk of shorting of the device structure and quenching of the electroluminescence of at least one layer of organic material.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to substitute the first electrode (layer of Ca) of Burroughes by two electrode layers – first one thin electrode of an alkali metal (constituting the first electrode) and second one of conductive material covering the thin electrode as taught by Pichler for providing efficient injection of negative charge carriers and low operating voltage and preventing excessive doping and minimizing the risk of shorting of the device structure and quenching of the electroluminescence of at least one layer of organic material.

The combined structure of the cathode of Burroughes and Pichler comprises four electrodes – first electrode of Ca (thin layer of alkali metal, alkali earth metal), second electrode of Al, third electrode of Li and fourth electrode of Al.

Regarding claim 2 Burroughes and Pichler disclose the first electrode (thin electrode) includes first metal (Ca) and the third electrode includes a second metal (Li).

Regarding claim 3 Pichler discloses (column 3 lines 58-65) the first metal includes one of an alkali metal and an alkali earth metal.

Regarding claim 4 Burroughes discloses (column 8 claim 10) the second metal includes one of an alkali metal and an alkali earth metal.

Regarding claims 5 and 6 Burroughes and Pichler disclose the first metal and second metal can be one of an alkali metal and alkali earth metal. Burroughes and Pichler do not explicitly disclose both metals to be the same. It is further noted that applicant's specific selection of the first metal and second metal being same does not solve any of the stated problem or yield any unexpected result, thus, one of ordinary skill in the art at the time of invention would consider the arrangement of having the first metal and second metal being same (alkali or alkali earth metal) as obvious matter of design choice.

Regarding claim 7 Burroughes and Pichler disclose the first metal (Ca) of first electrode and the second metal (Li) of third electrode are not the same.

Regarding claims 9 and 10 Burroughes and Pichler disclose the second electrode includes a first conducting metal Al and fourth electrode including a second conducting metal Al, first and second conducting metals being the same.

Regarding claims 11 and 12 Pichler and Burroughes disclose (column 4 lines 10-16 to Pichler, column 7 lines 18-2 to Burroughes) the first conducting metal Al and the second conducting metal Ag, not same as the first conducting metal.

Claim 17 recites the method of forming an organic electroluminescent device with the same limitations as of claim 1 and hence is rejected for the same reason (see rejection of claim 1).

Claims 13, 14 and 18,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,707,248 to Burroughes et al., and U.S. Patent 6,255,774 to Pichler and further in view of Applicant's admitted prior art (referred as AAPA).

Regarding claim 13 Burroughes and Pichler do not disclose sealing member combined with the anode substrate to enclose the anode substrate, the thin organic layer and the cathode.

AAPA discloses ([00014] to [00019]) the organic electroluminescent device is enclosed within a sealing member 18 for preventing contact with oxygen or moisture causing degradation of the luminescence characteristic of the organic layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to enclose the anode substrate, the thin organic layer and the cathode of Burroughes and Pichler in a sealing member as taught by AAPA for preventing contact with oxygen or moisture causing degradation of the luminescence characteristic of the organic layer.

Regarding claim 14 AAPA discloses an absorbent adhered to the sealing member in a position facing the cathode to remove moisture from the inner space.

Claims 18 and 19 essentially recite the method of forming an organic electroluminescent device having the same limitations as of claims 13 and 14 respectively and hence are rejected for the same reasons.

Claims 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,707,248 to Burroughes et al., and U.S. Patent 6,255,774 to Pichler and further in view of U.S. Patent 5,731,661 to So et al.

Regarding claim 15 Burroughes and Pichler are silent about a protection layer coated on the anode substrate, the thin organic layer and the cathode.

So in same field of endeavor of organic electroluminescent devices discloses (Fig. 3 column 2 lines 1,2 column 3 lines 1-9) a protection layer (passivating or sealing layer) 18 coated on the anode substrate, organic layer and the cathode. So further notes that this configuration provides improved method of passivating electroluminescent organic devices which is relatively convenient and inexpensive to perform and provides long-term stability of the device.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to provide a protection layer as taught by So on the anode substrate, organic layer and the cathode of Burroughes and Pichler for protecting the device from oxygen and moisture in a convenient and inexpensive way.

Claim 20 essentially recites the method of forming the organic electroluminescent device with same limitation as of claim 15 and hence is rejected for the same reason.

Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,707,248 to Burroughes et al., U.S. Patent 6,255,774 to Pichler and U.S. Patent 5,731,661 to So et al. and further in view of AAPA.

Regarding claim 16 Burroughes, Pichler and So do not disclose the absorbent on the upper surface of the protection layer.

AAPA discloses an absorbent attached to the sealing material to remove moisture from the inner space.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to provide the absorbent on the upper surface of the protection layer of Burroughes, Pichler and So for removing moisture from the space around the protection layer and thus reducing ingress of moisture into the organic electroluminescent device.

Claim 21 essentially recites the method of forming the organic electroluminescent device with same limitation as of claim 16 and hence is rejected for the same reason.

### ***Response to Arguments***

Applicant's arguments filed March 30, 2005 have been fully considered but they are not persuasive.

In response to applicant's argument that by replacing the first electrode of Burroughes et al. with the cathode electrode of Pichler, the cathode electrode would contact the second electrode of Burroughes et al. and not the electroluminescent layer, the Examiner respectfully disagrees. The first electrode 15 of calcium of Burroughes is substituted with two-layer electrode (first and second electrodes) structure (layers 4 and 5) of Pichler for providing efficient injection of negative charge carriers and low operating voltage and preventing excessive doping and minimizing the risk of shorting of the device structure and quenching of the electroluminescence of at least one layer of organic material. The second 16 and third 17 electrodes of Burroughes are now third and fourth electrodes of the combined cathode structure.

The combined structure of the cathode of Burroughes and Pichler comprises four electrodes – first electrode of Ca (thin layer 4 of alkali metal, alkali earth metal of Pichler in Fig. 1), second electrode of Al (the covering electrode 5 of Pichler in Fig. 1), third electrode of Li and fourth electrode of Al. The first electrode thin layer of alkali metal (layer 4 of Pichler) is in contact with the electroluminescent layer (emissive layer 12 in Fig. 2 of Burroughes) of below and the covering electrode (layer 5 of Pichler) is in contact with the electrode 16 above of Burroughes. The first electrode of thin alkali metal being in contact with the electroluminescent layer provides excellent electron injection and low turn-on and operating voltage and because of the limited thickness and hence amount of material of this layer, excessive doping and electroluminescence quenching is prevented.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S.R.

Sikha Roy  
Patent Examiner  
Art Unit 2879

Karabi Guharay  
Karabi Guharay  
Primary Examiner